

PATENT COOPERATION TREATY

REC'D 25 JUL 2005

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From the
INTERNATIONAL SEARCHING AUTHORITY

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To:

see form PCT/ISA/220

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**
(PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/US2004/034599

International filing date (day/month/year)
18.10.2004

Priority date (day/month/year)
24.10.2003

International Patent Classification (IPC) or both national classification and IPC
G03F7/20

Applicant
INTEL CORPORATION

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

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**WRITTEN OPINION OF THE
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International application No.
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Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ in written format
 - ☐ in computer readable form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

Box No. II Priority

1. ☐ The validity of the priority claim has not been considered because the International Searching Authority does not have in its possession a copy of the earlier application whose priority has been claimed or, where required, a translation of that earlier application. This opinion has nevertheless been established on the assumption that the relevant date (Rules 43bis.1 and 64.1) is the claimed priority date.
2. ☒ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43bis.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.
3. Additional observations, if necessary:

see separate sheet

**WRITTEN OPINION OF THE
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Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	2-4,6,8,9,13,18-24
	No: Claims	1,5,7,10-12,14,15-17
Inventive step (IS)	Yes: Claims	
	No: Claims	1-24
Industrial applicability (IA)	Yes: Claims	1-24
	No: Claims	

2. Citations and explanations

see separate sheet

**WRITTEN OPINION OF THE
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AUTHORITY (SEPARATE SHEET)**

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**Re Item II
Priority**

The claimed priority is deemed to be invalid, because the filing date of the priority document is 7.10.2003 instead of 24.10.2003 and therefore, the application has not been filed within the priority period.

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following document:
D1: US-A-5 705 321
D2: EP-A-0 915 394
- 2 The present application does not meet the criteria of Article 33(1) PCT, because the subject matter of certain claims is not new in the sense of Article 33(2) PCT.
 - 2.1 The document D1 discloses (the references in parentheses applying to this document):
*A system comprising:
a first apparatus (Figures 3, 4; column 5, line 60 - column 6, line 21) to radiate an interference pattern (column 6, lines 8 - 21) of lines and spaces on a photoresist, the lines having a substantially first width (implicit), the spaces being exposed to radiation (figures 1A - 1H); and
a second apparatus (column 6, lines 49 - 61) to radiate selected areas of the photoresist (claim 1), the selected areas exposing portions of the lines to radiation, wherein the pitch of the selected areas exposed by the second subsystem is at least one and a half of the pitch (implicit, column 2, lines 58 - 63; the ratio of resolution of interferometric techniques and conventional techniques is such that the second subsystem exposes necessarily regions with said larger pitch) of the interference pattern.*

Therefore, claim 1 is not novel.

The same applies *mutatis mutandis* to independent claims 10 and 14.

An alternative novelty objection could be based on document **D2**, because **D2** discloses (abstract) a first apparatus to radiate an interference pattern having a substantially first width (figure 11A), a second apparatus to radiate selected areas with a second pattern (figures 10, 11A - 11D, paragraph 0032, 104, 105) wherein the pitch of the second pattern is at least one and a half of the pitch of the interference pattern (cf. figure 11A - 11D, paragraph 0032).

- 2.2 Dependent claims 2-9, 11 - 13, 15 - 24 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT with respect to novelty or inventive step:

The features of **claims 2 - 4** of pitch ratios between the printed pitches in the first and second apparatus and optical proximity correction of the mask in the second apparatus ratios would be provided as a matter of routine.

D2 discloses (152, cf. figure 15) the additional feature of **claim 5**, the first apparatus comprising a beamsplitter.

The additional feature of **claim 6** the first apparatus comprising a diffraction grating would be provided as a matter of routine.

D2 discloses (paragraph 0032) the additional feature of **claim 7** the second apparatus being a mask based lithography tool.

The additional feature of **claims 8 and 9** the second exposure apparatus being a electron beam tool or an maskless lithography tool would be provided as a matter of routine.

D1 discloses (column 2, lines 54 - 63) the feature of **claim 11** of the pitch of the features being greater than one and a half times a pitch of the interference pattern.

D1 discloses (column 6, lines 39 - 61) the feature of **claim 12** the radiation having a

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pre-determined wavelength and the interference pattern approaching a pitch equal to the wavelength divided by two.

The additional feature of **claim 13** the print mask being generated from a Boolean subtraction of a final design layout from the interference pattern would be provided as a matter of routine.

D1 discloses (implicit) the **claim 15** alignment sensor.

D1 discloses (implicit) the **claim 16** common control system.

D1 discloses (abstract) the **claim 17** combination with an projection optical system.

The additional features of **claims 18 - 24** of combining the interference lithography apparatus with all kinds of well known lithography systems would be provided as a matter of routine.